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Sir:

Transmitted herewith for filing is the patent application of

Inventor(s): **WENDY F. HUNTER**

For: **USER INTERFACE FOR INSTANT AND FULL-FEATURED INDEX PAGE PRINTING FROM A DIRECT-CONNECT PRINTER**

Enclosed are:

__XXX__   Specification (10 pps); Claims (6 pps); Abstract (1pp);

__XXX__   __7__ sheets of drawings;

__XXX__   Declaration and Power of Attorney;

_____   An assignment of the invention to: _____
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_____   Verified Statement Claiming Small Entity Status; and

_____   Priority of U.S. Patent Application Serial No._____, filed on
_____, is claimed under 35 U.S.C. §120.

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Multiple Dependent Claim Fee		x $260.00 = $0 00		
TOTAL FILING FEE		$912.00		
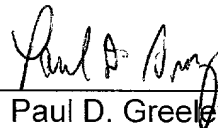
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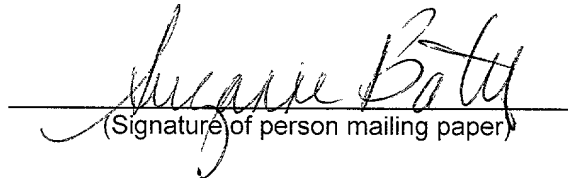September 28, 2000
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USER INTERFACE FOR INSTANT AND FULL-FEATURED INDEX PAGE PRINTING FROM A DIRECT-CONNECT PRINTER

FIELD OF THE INVENTION

5   This invention relates to printers, and in particular, to a user interface for printing index pages of images.

BACKGROUND OF THE INVENTION

        Currently, digital cameras are arranged to be able to download image files to personal computers, for
10   subsequent reproduction by a printer. Images from a digital camera are typically stored on a detachable memory card. The memory card is inserted into an appropriate receptacle that is attached to an external computing device, such as a personal computer or a
15   printer. A facility is typically provided on the computing device or the printer for printing index pages, that is, a page, or pages, of thumbnail representations of all the images stored on the memory card. A thumbnail representation of an image is a
20   reduced version of that image, usually with enough detail to discern the image from others. The facility for printing index pages may include a menu selection on the computing device or a button on the printer. The index pages are useful for reviewing image files on
25   the memory card, and for selecting individual image files to be printed.

        When printing an index page, a user is not able to select the images that will be printed. Invoking the index page facility causes all the images on the memory
30   card to be printed. For users with high capacity memory cards this may be disadvantageous, as a large

number of images are printed that are not required,
wasting time, media, and ink. If multiple events are
recorded on the same memory card, a user must print the
images for all the events, again wasting time, media,
5   and ink.

Furthermore, in the conventional approach the
images on index pages are all printed in landscape
orientation without regard for the orientation of the
image. When reviewing the index pages, the user must
10   turn his head or the index page to view those images
that do not have a landscape orientation.

Each image on the index page is designated by an
image number, usually superimposed on a corner in the
field of the image. The image number thus obscures the
15   area of the image over which it is superimposed. Also,
the image number does not provide an absolute
identification of the image. It is simply the number
of an image in the memory card, and changes when images
are deleted from the memory card. There is no absolute
20   identification of the image, such as a date or
filename, to specifically distinguish an image, and
which does not change after the image is acquired.

It is an object and advantage of this invention to
provide a user with the ability to select a subset of
25   images to be printed when printing an index page. A
user is not required to print all images on the memory
card when printing an index page. It is a second
object and advantage of this invention to provide index
pages where the images are printed in the orientation
30   in which they were acquired. That is, images are
printed "right side up" so users do not have to turn
their heads to view individual images on an index page.
It is a further object and advantage of this invention
to provide an absolute identifier for each image on the

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index page that does not change after the image has been acquired. Further, image identifiers are printed outside the field of the image and thus do not obscure the image. It is a further object and advantage of

5 this invention to automatically select the size of the thumbnail image depending on the size of the printing media. For example, when index pages are being printed on A4 paper, a thumbnail is printed in a larger format than when index pages are printed on A6 paper, allowing

10 for a more efficient use of paper.

SUMMARY OF THE INVENTION

A user interface for a printer is disclosed for printing image files. The user interface includes a display for displaying information, including messages

15 to a user, an input device for enabling the user to respond to the displayed messages, an interface to a detachable memory device including at least one image file, and a processor coupled to the input device, display, and to the interface. The processor is

20 responsive to a user input to print a thumbnail of the image file, in the same orientation in which the image file was acquired, by utilizing stored orientation information. The processor is also responsive to a user input to print a subset of the image files. The

25 thumbnails are printed with an image number, a date, and a unique identifier of the image file.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a printer suitable for practicing this invention.

30 Figure 2 shows a block diagram of the printer.

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Figure 3 is a diagram of a front panel portion of the printer, the front panel providing a user interface.

Figure 4 shows a partial view of the printer and
5   an apparatus for accepting memory cards.

Figure 5 is a flow chart of operations performed for printing index pages.

Figures 6A, 6B, and 6C show examples of messages displayed on a display of the printer.

10   Figure 7 shows a schematic representation of a set of thumbnails printed by utilizing the disclosed user interface.

DETAILED DESCRIPTION OF THE INVENTION

A printer 10 in which this invention is practiced
15   is shown in Figure 1. Printer 10 includes top cover 15, output tray 20, trays 25, 30 for media to be printed upon, paper guides 35, 40, display 45, memory card slots 50, 55, and power button 60.

Figure 2 shows a block diagram of printer 10.
20   Printer 10 includes processor 60 for directing printer operations, front panel 65 for receiving user inputs and for displaying messages to a user, receptacle 70 for receiving a memory device, such as a memory card 75 from a digital camera (not shown), and a printing
25   engine 80. Printer 10 also includes read only memory (ROM) 82 for storing programs, including a printer operating system 84 and a page layout program 86 in accordance with the invention. Printer 10 further

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includes random access memory (RAM) 88 for storing temporary system operating parameters and temporary data for the page layout system.

5   Printer 10 is optionally connected to an external computing device 90 through link 100. The external computing device 90 may be a personal computer or any device capable of communicating with printer 10, and typically includes display 93, processor 95, and storage 97.

10   The processor 60 executes the programs in ROM 82 either automatically, in response to user inputs from front panel 65, or in response to inputs from external computing device 90, if it is connected.

Processor 60 preferably includes a facility 62 for 15   receiving and storing additional programs contained on computer storage media, also referred to herein as memory media 64, such as a floppy disk drive, a compact disk drive, or a memory cartridge. Such programs may include, for example, the printer operating system 84, 20   the page layout program 86, programs for controlling print engine 60, programs for operating on, or in response to, various file types, including direct print order format (DPOF) files, jpeg files, or gif files, upgrades for programs already residing in read only 25   memory (ROM) 82, and in general, programs related to printing operations and for printing images.

Front panel 65 is shown in greater detail in Figure 3. Front panel 65 includes display 45 for preferably providing messages, prompts, information as 30   to the content of memory card 75, information regarding

the operation of printer 10, and other information to
the user. Display 45 is preferably a 2-line, 16
characters per line, liquid crystal display. Front
panel 65 further includes power button 60 for turning

5   the printer on and off, button 170 for selecting a
number of copies to be printed, button 180 for
selecting a printed size of an image file, button 190
for selecting image files to be printed, and button 200
to cause the printer to print the selected image files.

10   Front panel 65 further provides button 210 to stop
printing, cancel a selection presented on display 45,
or to answer no to a question presented on display 45.
Button 220 is also provided to make a selection
presented on display 45, or to answer yes to a question

15   presented on display 45. Button 240 is provided for
saving selected image files to external computing
device 90, if it is connected, and button 250 is for
changing the printer settings. The printer settings
that may be changed by operating button 250 include the

20   page layout settings, which will be explained in
greater detail below.

    Figures 4A and 4B show a partial view of printer
10. Memory cards 75A and 75B are of the type used in
digital cameras for storing image files. Receptacle 70

25   preferably includes at least one connector 72 for
receiving the memory card 75A, which may be one known
as a CompactFlash™ memory card, and at least one
connector 74 for receiving a memory card 75B, which may
be one known as a SmartMedia™ memory card.

30   Turning now to Figures 5 and 6, in accordance with
the invention, in step A a user begins by taking

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photographs or recording images. This is preferably
done with a digital camera, but it is important to note
that the images may be generated by any means that
produces an appropriate image file format on a suitable
5   memory device, such as a memory card 75. Images are
stored in memory card 75 in a digital file format, for
example, a jpeg type file. Memory card 75 further
includes a date, and orientation information about each
image.

10   The user then removes memory card 75 from the
digital camera and inserts it into receptacle 70 of
printer 10 as in step B. When printer 10 is idle,
display 45 preferably shows three fields: quantity of
images chosen (top line), number of copies (bottom
15   left), and image size (bottom right) as shown in Figure
6C. Upon insertion of memory card 75 into receptacle
70, the printer operating system detects the memory
card 75 (step C) and display 45 preferably shows the
word "Reading …", as shown in Figure 6A. Upon
20   completion of the read step, display 45 shows the
number of image files found on the memory card 75 (step
D) as shown in Figure 6B. Then display 45 displays
"ALL PHOTOS, 1 copy, Index" as shown in step E of
Figure 5 and in Figure 6C.

25   At this point a user may operate button 200 to
print all the images on memory card 75 on index pages
as in step F. Alternatively, as shown in step G of
figure 5, the user may operate the front panel button
190 to select which image files to print. This is
30   preferably done by operating button 190 to cause
display 45 to display the number corresponding to the
desired image as shown in Figure 6D. When the number
of the desired image is displayed, a user operates
button 220 to select the image. This process is
35   repeated until all of the desired images have been

selected. A user may also select a range of images to be printed. To select a range, the user operates button 190 until the number of the first image of the range is displayed. The user operates button 220 until a dash appears in display 45. The user then operates button 190 to select the last image of the range, and then operates button 220 to add the number of the last image to the range of images to be selected. For all selections of images, the order in which the user selects the image files is the order in which they will be printed.

As stated above, in step F the user then operates button 200 on front panel 65 to cause the printer to print the index pages.

After operating button 200 to print the index pages, the user may optionally select a paper type (step H) and a paper size (step I). The printer then selects the size of the thumbnails from the paper size as in step J, and prints the thumbnails (step K).

The resulting index pages comprise a thumbnail of each image file selected by the user from memory card 75. The images are printed in the orientation in which they were originally acquired, that is, they are always printed "right side up" regardless of whether they are formatted in a landscape or portrait orientation. The orientation of the image is preferably determined by the source of the image file.

The source of the image, for example, a digital camera, may have a sensor which detects the orientation of an image as it is being acquired and inserts the information in the image file. Some image sources allow the user to rotate the image to a particular orientation and then save the orientation information

as part of the image file. It is also contemplated that the image source may store the image orientation information separately on the memory card 75.

5　　To determine the orientation of each image, the printer 10 queries the image file, or the orientation information, as appropriate, on the memory card 75. In the event that the memory card 75 does not include orientation information, the printer 10 defaults to a landscape orientation for that image file.

10　　Included with each thumbnail is an image number, which may change as files are deleted from the memory card 75, and a unique identifier. The unique identifier is preferably the filename that is assigned to the image file by the digital camera in the memory 15　card 75, and does not change, thus providing an absolute identifier for the image. The date the image file was acquired is also included with the thumbnail. The image number, filename, and date are printed outside the field of the thumbnail image and, as such, 20　do not obscure the image, allowing a user to view the entire thumbnail.

The size of the printed thumbnails is automatically determined from the paper size. For A/A4 paper, the length of the thumbnail image is about 1.5 25　inches. For 4x6 inch, Hagaki, and A6 paper, the length of the thumbnail image is about 1.1 inches. This allows about 25 thumbnails to be printed on A/A4 paper and about 9 images to be printed on 4x6 inch, Hagaki, and A6 paper. The other dimension of the image is 30　determined by the image aspect ratio. The index images are not cropped by the printer 10.

Figure 7 shows a schematic example of a set of thumbnails that have been printed by utilizing the user

interface. Both the thumbnails having a landscape
orientation 300 and the thumbnails having a portrait
orientation 320 are printed "right side up" so users do
not have to turn their heads to view the individual

5   thumbnails. Each thumbnail has an image number 300A, a
unique identifier 300B, and a date 300C, which are
printed outside the border 310 of the thumbnails 300,
320.

It is important to note that while the user

10 interface has been described in the context of a
printer, it may be embodied in any suitable device,
connected directly or indirectly to the printer 10.
For example, the printer user interface may be embodied
in the external computing device 90, the display 93 and

15 an appropriate input device. The user interface may
also be included in an external computer, or a suitably
equipped internet appliance connected to printer 10
through the internet or another wired or wireless
network.

20 While the invention has been particularly shown and
described with respect to preferred embodiments thereof,
it will be understood by those skilled in the art that
changes in form and details may be made therein without
departing from its scope and spirit.

CLAIMS

1. A printer user interface comprising:

a display for displaying information, including messages to a user;

5   an input device for enabling the user to respond to the displayed messages;

an interface to a detachable memory device including at least one image file; and

a processor coupled to said input device, said
10   display, and to said interface, said processor responsive to a first user input to print a thumbnail of said at least one image file in the same orientation in which said image file was acquired by utilizing stored orientation information.

15   2. The user interface of claim 1, wherein said at least one image file is a plurality of image files forming a set of image files, and said processor is further responsive to a second user input to print an index page of thumbnails of a selected subset of said
20   plurality of image files.

3. The user interface of claim 1, wherein said processor is further responsive to a third user input, specifying a number of thumbnails to be printed for each of said at least one image file.

25   4. The user interface of claim 1, wherein said at least one image file is assigned a unique identification in said detachable memory device, and

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wherein said thumbnail is printed with said unique identification.

5. The user interface of claim 4, wherein said at least one image file is assigned an image number and a date in said detachable memory device, and said thumbnail is printed with said image number and date.

6. The user interface of claim 5, wherein said unique identification, said image number, and said date are printed outside of a border of said thumbnail.

7. The user interface of claim 1, wherein a printed size of said thumbnail is determined by a size of a sheet on which said thumbnail is to be printed.

8. A printer comprising:

a user interface further comprising:

a display for displaying information, including messages to a user;

an input device for enabling the user to respond to the displayed messages;

an interface to a detachable memory device including at least one image file; and

a processor coupled to said input device, said display, and to said interface, said processor responsive to a first user input to print a thumbnail of said at least one image file in the same orientation in which said image file was acquired by utilizing stored orientation information.

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9.   The printer of claim 8, wherein said at least one image file is a plurality of image files forming a set of image files, and said processor is further responsive to a second user input to print an index
5   page of thumbnails of a selected subset of said plurality of image files.

10.   The printer of claim 8, wherein said processor is further responsive to a third user input, specifying a number of thumbnails to be printed for
10   each of said at least one image file.

11.   The printer of claim 8, wherein said at least one image file is assigned a unique identification in said detachable memory device, and wherein said thumbnail is printed with said unique identification.

15   12.   The printer of claim 11, wherein said at least one image file is assigned an image number and a date in said detachable memory device, and said thumbnail is printed with said image number and date.

13.   The printer of claim 12, wherein said unique
20   identification, said image number, and said date are printed outside of a border of said thumbnail.

14.   The printer of claim 8, wherein a printed size of said thumbnail is determined by a size of a sheet on which said thumbnail is to be printed.

25   15.   A method of printing images comprising the steps of:

acquiring at least one image in a digital file format; and

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printing a thumbnail of said at least one image
file in the same orientation in which the image file
was acquired by utilizing stored orientation
information.

5   16.   The method of claim 15, wherein said at least
one image file is a plurality of image files forming a
set of image files, said method further comprising the
step of printing an index page of thumbnails of a
selected subset of said plurality of image files.

10   17.   The method of claim 15, further comprising
printing a specified number of thumbnails for each of
said at least one image file.

18.   The method of claim 15, wherein said at least
one image file is assigned a unique identification,
15   said method further comprising the step of printing
said thumbnail with said unique identification.

19.   The method of claim 18, wherein said at least
one image file is assigned an image number and a date,
said method further comprising the step of printing
20   said thumbnail with said image number and date.

20.   The method of claim 19, further comprising
the step of printing said filename, said image number,
and said date outside of a border of said thumbnail.

21.   The method of claim 15, further comprising
25   the step of determining a printed size of said
thumbnail from a size of a sheet on which said
thumbnail is to be printed.

22. A memory media, including instructions for
controlling a user interface comprising a display for
displaying information, including messages to a user,
an input device for enabling the user to respond to the
5   displayed messages, an interface to a detachable memory
device including at least one image file, a processor
coupled to said input device, said display, and to said
interface, said memory media comprising:

means for controlling said processor to print a
10   thumbnail of said at least one image file in the same
orientation in which the image file was acquired by
utilizing stored orientation information.

23. The memory media of claim 22, wherein said at
least one image file is a plurality of image files
15   forming a set of image files, and said memory media
further comprises means for controlling said processor
to print an index page of thumbnails of a selected
subset of said plurality of image files.

24. The memory media of claim 22, further
20   comprising means for controlling said processor to
print a specified number of thumbnails for each of said
at least one image file.

25. The memory media of claim 22, wherein said at
least one image file is assigned a unique
25   identification, said memory media further comprising
means for controlling said processor to print said
thumbnail with said unique identification.

26. The memory media of claim 25, wherein said at
least one image file is assigned an image number and a

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date, said memory media further comprising means for controlling said processor to print said thumbnail with said image number and date.

27.   The memory media of claim 26, further
5 comprising means for controlling said processor to print said filename, image number, and date outside a border of said thumbnail.

28.   The memory media of claim 22, further comprising means for controlling said processor to
10 determine a printed size of said thumbnail from a size of a sheet on which said thumbnail is to be printed.

10991850-1

ABSTRACT OF THE DISCLOSURE

A user interface for a printer is disclosed for
printing image files. The user interface includes a
display for displaying information, including messages
5   to a user, an input device for enabling the user to
respond to the displayed messages, an interface to a
detachable memory device including at least one image
file, and a processor coupled to the input device,
display, and to the interface. The processor is
10   responsive to a user input to print a thumbnail of the
image file, in the same orientation in which the image
file was acquired, by utilizing stored orientation
information. The processor is also responsive to a
user input to print a subset of the image files. The
15   thumbnails are printed with an image number, a date,
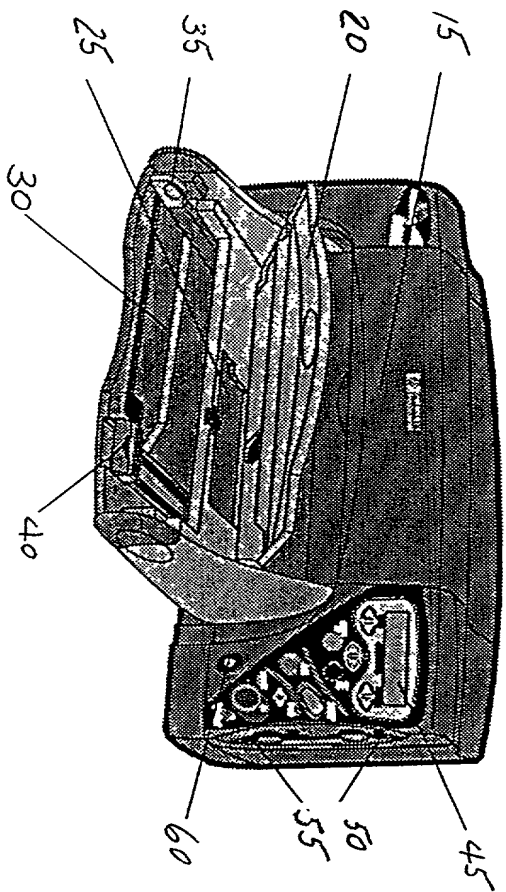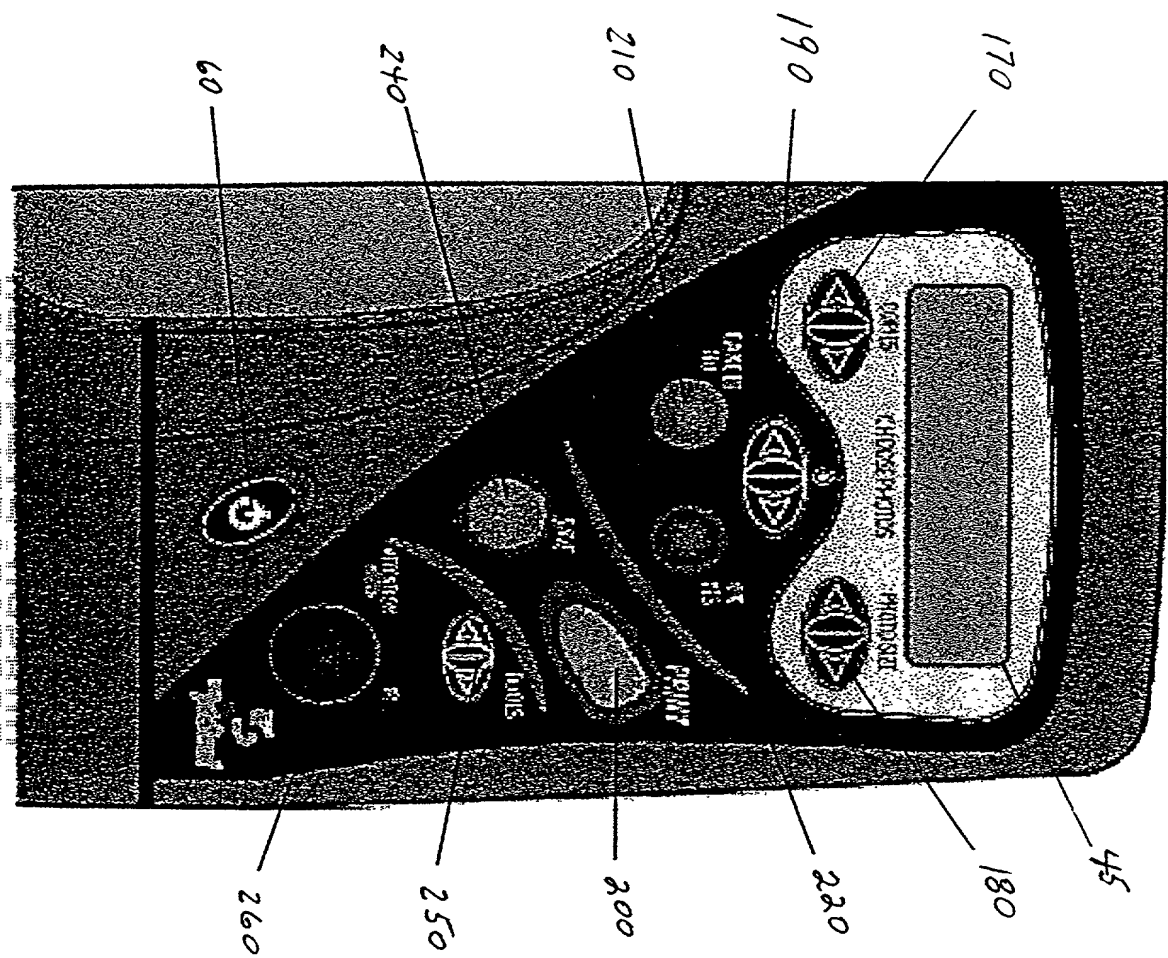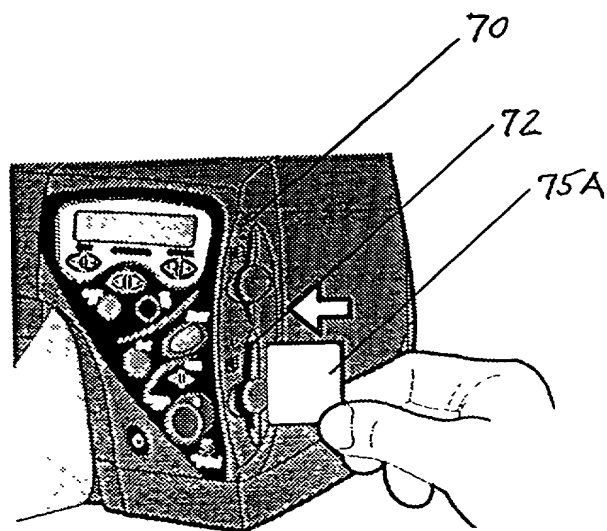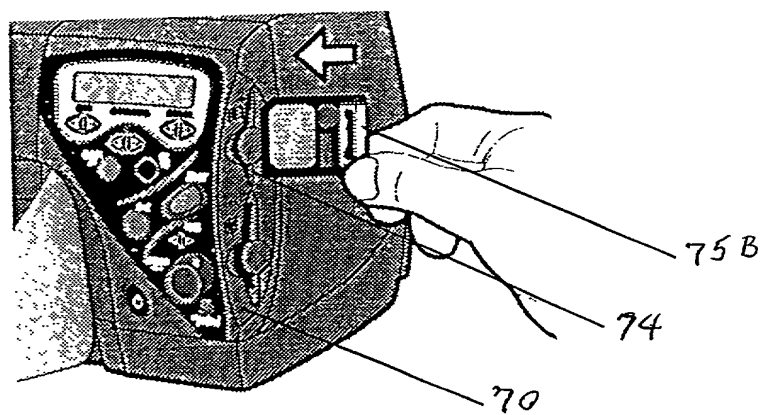and a unique identifier of the image file.

FIG. 1

10

FIG.2

FIG. 3

FIG. 4A

FIG. 4B

A ～

| User acquires images with digital camera |

B ～

| User inserts memory card into printer |

C ～

| Printer detects memory card |

D ～

| Printer displays number of images on memory card |

E ～

| Printer displays "ALL PHOTOS" message |

G ～

| User selects images to include on index page |

F ～

| User presses Print button |

H ～

| Choose paper type on Printer |

I ～

| Choose paper size on Printer |

J ～

| Printer selects image size |

K ～

| Printer prints Index page |

Fig. 5

Reading ....

Fig. 6A

XX Photos
found on card

Fig. 6B

ALL PHOTOS

1 copy   Index

Fig. 6C

3, 6, __

Fig. 6D

300

310   300

320

300

320

1   3-2-2000
UNIQUE ID1

2   3-4-2000
UNIQUE ID2

3   3-5-2000
UNIQUE ID3

4   3-6-2000
UNIQUE ID4

5   3-7-2000
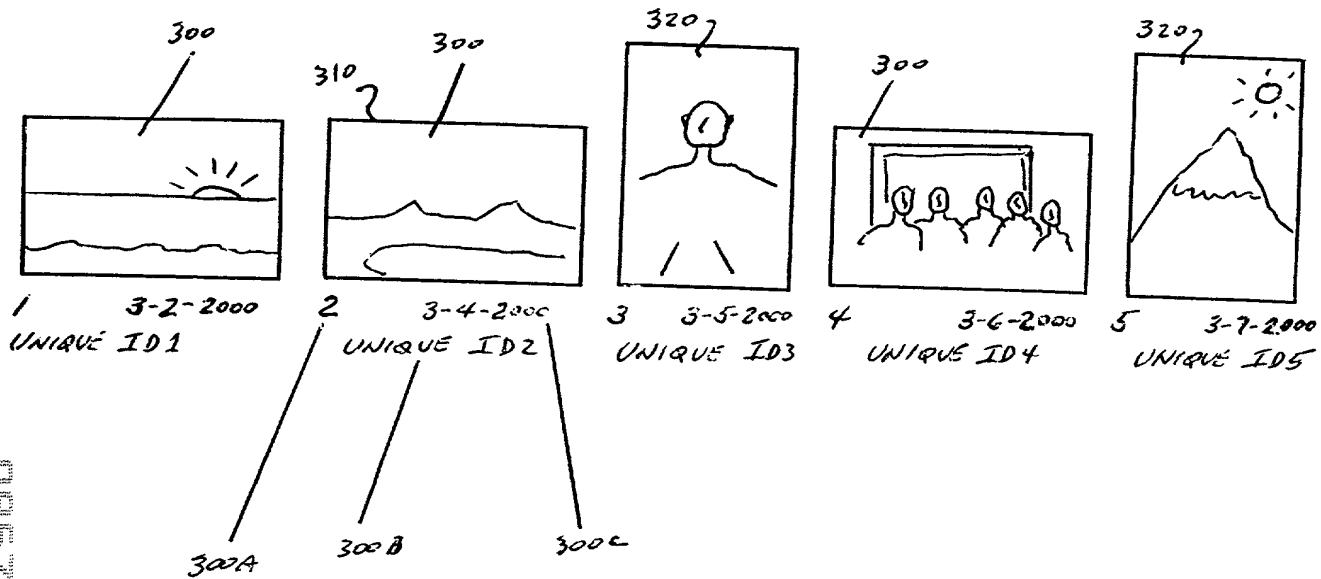UNIQUE ID5

300A   300B   300C

FIG. 7

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

Docket No. **10991850-1**

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

USER INTERFACE FOR INSTANT AND FULL- FEATURED INDEX PAGE PRINTING FROM A DIRECT-CONNECT PRINTER

the specification of which

(check one)   **X** is attached hereto.

    __ was filed on _____ as Application Serial No. _____ and was amended on_____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to the patentability of this application as defined in Title 37, Code of Federal Regulations, 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate(s) listed below and have also identified below any foreign application(s) for patent or inventor's certificate(s) having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)   Priority Claimed

_____ _____	_____	___ Yes ___ No	
(Number) (Country)	(Day/Mon/Year Filed)		
_____ _____	_____	___ Yes ___ No	
(Number) (Country)	(Day/Mon/Year Filed)		

I hereby claim the benefit under Title 35, United States Code, 119(e) and 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Applic. Ser. No.)	(Filing Date)	(Status) (pat., pend., abandon.)

(Applic. Ser. No.)	(Filing Date)	(Status) (pat., pend., abandon.)

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

NAMES	REGISTRATION NUMBERS
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Paul D. Greeley	31,019
Charles N.J. Ruggiero	28,468

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

FULL NAME OF INVENTOR RESIDENCE & CITIZENSHIP	LAST NAME **HUNTER** CITY **SAN DIEGO**	FIRST NAME **WENDY** STATE OR COUNTRY **CALIFORNIA, USA**	MIDDLE NAME **F.** CITIZENSHIP **USA**
POST OFFICE ADDRESS	P.O. ADDRESS **17356 FRONDOSO DRIVE**	CITY & STATE **SAN DIEGO, CA**	ZIP CODE **92128**

Inventor's
Signature _____ Date ___9/21/00___